

# Table of Contents

## Preface and Committees

## Chapter 1: Utilization of Alternate Energy for Sustainability

|                                                                                                                                                                                                             |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Analysis of Three Port Full Bridge and Half Bridge DC-DC Converter Interfacing Renewable Energy System</b><br>M. Venmathi and R. Ramaprabha                                                              | 3   |
| <b>Comparative Analysis of Solution Methods to Power Electronic Interface Modeling for Renewable Energy Applications</b><br>D. Randhir, S. Umashankar, D. Vijayakumar and D.P. Kothari                      | 9   |
| <b>Investigation of PMSG Fed Diode-Clamped Multilevel Inverter for Wind Energy System</b><br>A.B. Sankar and R. Seyezhai                                                                                    | 16  |
| <b>Modeling of Photovoltaic Array and Simulation of MPPT Algorithm</b><br>G. Rohini, V. Jamuna, M. Abirami and R. Ramprakash                                                                                | 23  |
| <b>A Review of Mathematical Models for Performance Analysis of Hybrid Solar Photovoltaic - Thermal (PV/T) Air Heating Systems</b><br>P. Baskar and G. Edison                                                | 29  |
| <b>Structural Analysis of a Wind Turbine Blade</b><br>A. Benham, K. Thyagarajan, S.J. John and S. Prakash                                                                                                   | 40  |
| <b>Application of Particle Swarm Optimization Technique for the Design of Maximum Power Point Tracking</b><br>R. Venugopalan, N. Krishnakumar, R. Sarjila and N. Rajasekar                                  | 47  |
| <b>Application of Wind Energy Source to Large Scale Desalination System Prefeasibility Analysis-Investigation of Wind Power Potential in Coastal Areas of Tamilnadu</b><br>B.S. Saravana and V. Rajini      | 57  |
| <b>Performance Analysis of Flat Plate Solar Water Heater by Changing the Heat Pipe Material</b><br>P. Sivakumar, W.C. Raj, N.J. Malathi and S. Balakrishnan                                                 | 64  |
| <b>Effect of Working Pressure on Structural, Electrical and Optical Properties of CIGS Thin Film Deposited by PLD</b><br>P.K. Mishra, Y.K. Gautam, J.N. Prasad, A.K. Choudhary and R. Chandra               | 70  |
| <b>Modelling and Simulation of 3-phase Transformerless Split Inductor Multilevel Inverter for Grid Connected Photovoltaic System</b><br>C. Bharatiraja, R. Palanisamy, S. Sadagopan, R. Latha and S.S. Dash | 75  |
| <b>Implementation of a Low Cost Resonant Boost Converter Connected Photo Voltaic System</b><br>R.C. Ilambirai and R. Boga                                                                                   | 80  |
| <b>Three Phase Hybrid 7-Level Inverter with 60 Degree PWM Scheme for PV Applications</b><br>R. Abirami, V. Jaikrishna, N. Chellammal, D.S. Subhransu and V. Velmurugan                                      | 84  |
| <b>Performance Studies on Solar Photovoltaic Thermal System for Crop Drying</b><br>M.B. Gorawar, P.P. Revankar, V. Tambrallimath and K. Shekar                                                              | 90  |
| <b>Development of Computational Technique for Better Utilization of Renewable Energy</b><br>R.P.J. Kiruba and R. Arulmozhiyal                                                                               | 98  |
| <b>Influence of Source - Substrate Distance of Cu<sub>4</sub>SnS<sub>4</sub> Thin Films Grown by Co-Evaporation</b><br>V.P.G. Vani, M.R.V. Reddy and K.T.R. Reddy                                           | 103 |
| <b>Simulation and Hardware and Implementation of Directly Coupled Four Phase Interleaved Boost Converter for Fuel Cells</b><br>M. Tamilarasi and R. Seyezhai                                                | 109 |
| <b>Development and Field Test Performance of a Non-Conventional Unidirectional Co-Axial Two Series Rotors Micro Wind Turbine</b><br>S.A. Kale and S.N. Sapali                                               | 119 |
| <b>Maximum Power Point Tracking Based on Look Up Table Approach</b><br>S. Malathy and R. Ramaprabha                                                                                                         | 124 |
| <b>Sensorless Control of PMSG Wind Turbine Using ANFIS</b><br>A.D. Janarthanan, L. Venkatesan and G. Muruganandam                                                                                           | 131 |

|                                                                                                                                                                 |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Design and Modeling of Photovoltaic System Fed Brushless DC Motor</b><br>M. Pandikumar, R. Ramaprabha and R. Muthu                                           | 136 |
| <b>Cost Effective Wind Energy Conversion Scheme Using Self-Excited Induction Generator</b><br>K. Subramanian and S.P. Sabberwal                                 | 143 |
| <b>Performance Evaluation and Exhaust Emission Analysis of a CI Engine Fuelled with Pongamia Pinnata Biodiesel and its Blends</b><br>G.A. Miraculas and N. Bose | 151 |
| <b>Experimental Analysis of Energy Recovery from an Internal Combustion Engine Exhaust Using Rankine Cycle</b><br>C. Bibin and P. Seenikannan                   | 158 |
| <b>Experimental Investigation of Nano Particles Blended with Water on Solar Flat Plate Collector</b><br>P. Sivakumar, W.C. Raj, N.J. Malathi and R. Balamurugan | 164 |

## **Chapter 2: Energy Efficient Automotive Technologies**

|                                                                                                                                                                                                                                             |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Spray Characteristics of Diesel and Biodiesel in Direct Injection Diesel Engine</b><br>P. Raghu, K. Thilagan, M. Thirumoorthy, S. Lokachari and N. Nallusamy                                                                             | 173 |
| <b>Experimental Study on the Spray Characteristics of Diesel and Biodiesel (Jatropha Oil) in a Spray Chamber</b><br>P. Raghu, M.S. Mukilan, R.B. Viswanath, S.A. Krishna and N. Nallusamy                                                   | 180 |
| <b>Effect of DEE Injection in Pongamia Pinnata Biodiesel Fuled CI Engine Using Hydrogen as Secondary Fuel</b><br>C. Jegadheesan, P. Somasundaram, B. Meenakshipriya and U.P. Vignesh                                                        | 188 |
| <b>Development of Energy Saving and Environment Friendly Aluminum Hybrid Composite Materials for Vehicle Applications</b><br>N. Tiruvenkadam, P.R. Thyra, M. Senthilkumar, T.D. Bosco, A. Srikanth and S.S.I. Faiyaz                        | 195 |
| <b>Performance Improvement on a Single Cylinder Diesel Engine Powered with Pongamia Biodiesel by Incorporating Swirling Grooves</b><br>J.I.J.R. Lalvani, M. Parthasarathy, A.V. Arunkumar and K. Annamalai                                  | 199 |
| <b>Influence of Dual Fuel Twin Injection on Diesel Engine Combustion and Emission Characteristics</b><br>K.S. Kumar and R.T.K. Raj                                                                                                          | 206 |
| <b>Mechanical Modifications to Convert Small Two Strokes Carbureted Engine to Electronic Fuel Injection System Engine to Reduce Emission and Fuel Consumption</b><br>K.D. Sapate and A.N. Tikekar                                           | 213 |
| <b>Comparison of Performance and Emission Characteristic of Tamanu, Mahua and Pongamia Biodiesel in a Di Diesel Engine</b><br>M. Parthasarathy, J.I.J.R. Lalvani, B. Parthiban and K. Annamalai                                             | 218 |
| <b>Numerical Investigations of Spray Droplet Parameters in a Direct Injection Diesel Engine Using 3-Z Extended Coherent Flame Model</b><br>M. Renganathan and R.T.K. Raj                                                                    | 226 |
| <b>Analysis and Experimentation of a Three Phase Asymmetric Cascaded Multilevel Inverter for Electric Vehicles</b><br>R. Seyezhai, K.R. Sree, K. Sivapathi and V. Vardhaman                                                                 | 231 |
| <b>Investigations on the Effect of Bio Fuel Enhancer Additive with Cashew Nut Shell Liquid Biodiesel Blends on Engine Performance and Pollutant Emissions in a Diesel Engine</b><br>T. Pushparaj, C. Lalithmuneendirakumar and S. Ramabalan | 238 |
| <b>Performance and Emission Characteristics of Low Heat Rejection Diesel Engine Fuelled with Rice Bran Oil Biodiesel</b><br>G. Arunkumar, A. Santhoshkumar, M. Vivek, L.A. Raman, G. Sankaranarayanan and C. Dhanesh                        | 245 |
| <b>Effects of Compression Ratio on Performance and Emission of Internal Combustion Engine with Used Vegetable Oil Methyl Ester</b><br>N. Balakrishnan, K. Mayilsamy and N. Nedunchezian                                                     | 250 |
| <b>Experimental Studies on Performance and Emission Analysis in Diesel Engine Using Bio-Fuel (Neem Oil)</b><br>N. Kanthavelkumaran and P. Seenikannan                                                                                       | 255 |

## **Chapter 3: Energy Efficient Manufacturing Systems**

|                                                                                                                                                                                          |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Outlook of Indian Household Energy and Emission Profile</b><br>S.K. Yawale                                                                                                            | 265 |
| <b>Estimation of Energy and Carbon Saving Potential in Industrial Lighting System</b><br>P. Ganesan, S. Rajakarunakaran, M. Thirugnanasambandam and D. Devaraj                           | 272 |
| <b>Comparison Studies on Microwave &amp; Muffle Furnace Heat Treatment for Al-B<sub>4</sub>C Composite</b><br>K. Rajkumar, J.M.A. Charles, K.V. Kumar, J.J.C. Praveen and A. Padmanathan | 280 |

## **Chapter 4: Improving the Efficiency of Power Systems**

|                                                                                                                                                                                                           |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Comparison of Constant Instantaneous Power Control &amp; Synchronous Rotating Frame Strategy for Total Harmonic Reduction in Aircraft System (400Hz)</b><br>S. Khalid, A. Tripathi and V.M. Mishra     | 287 |
| <b>Uncertainty Modelled Power Flow Analysis for DG Sourced Power Systems</b><br>P. Sivakumar and D. Poornima                                                                                              | 298 |
| <b>Mitigation of Power Quality Problems Using DSTATCOM with Reduced DC Link Voltage</b><br>T.L. Saranya, G. Ezhilarasan and S.S. Dash                                                                     | 301 |
| <b>Nonlinear Unbalanced Load Compensation for PV Sourced Grid Connected Inverter</b><br>P. Sivakumar and M. Jeevitha                                                                                      | 308 |
| <b>Analysis and Stability Enhancement of DG Sourced Power System with Modified AVR and PSS</b><br>P. Sivakumar and C. Birindha                                                                            | 313 |
| <b>Harmonic and Power Factor Analysis with Reactor and Capacitor in Adjustable Speed Drive</b><br>M. Srinivasan, S.U. Praba and R. Suganthi                                                               | 317 |
| <b>Optimization Techniques for the Economic Dispatch Problem in Various Generation Plant</b><br>K. Thenmalar and A. Allirani                                                                              | 323 |
| <b>Mitigation of Power Quality Issues by Adaptive Current Hysteresis Band Controller Based Shunt Active Filter</b><br>N. Chellammal, V. Velmurugan, S.S. Dash and R. Abirami                              | 329 |
| <b>Synthesis and Characterization of PANI/Ferric Chloride Composite for Fabrication of Electrodes in Supercapacitor</b><br>D. Sivalingam, H. Elangovan, M. Subramanian, S.K. Kandasamy and M. Govindasamy | 334 |
| <b>Mitigation of Voltage Sags and Swells by Dynamic Voltage Restorer</b><br>S.P. Mishra, L. Varghese, J.P. Roselyn and D. Devaraj                                                                         | 338 |
| <b>A Novel Control Strategy for DVR to Improve Voltage Profile in Wind Farm</b><br>M.N. Himaja, S. Premalatha, S.S. Dash and P.C. Babu                                                                    | 344 |
| <b>Reliability Improvement in a Radial Distribution System Using DG</b><br>S.K. Singh, D. Sattianadan and M. Sudhakaran                                                                                   | 351 |
| <b>Speed Control of Induction Motor via Pic Controller Using Lab View</b><br>L. Venkatesan, A.D. Janarthanan, P.R. Aarthi and R. Arulmozhiyal                                                             | 359 |
| <b>Optimum Allocation of Distributed Generation Based on Nodal Pricing for Profit and Social Welfare Maximization</b><br>B. Biswal, D. Sattianadan, M. Sudhakaran and S.S. Dash                           | 364 |
| <b>Maximum Loss Reduction and Voltage Profile Improvement with Placement of Hybrid Solar-Wind System</b><br>E. Rekha, D. Sattianadan and M. Sudhakaran                                                    | 371 |
| <b>Transient Stability Improvement with Unified Power Flow Controller Using Fuzzy Logic and ANFIS Approach</b><br>S. Latha and C.K. Rani                                                                  | 378 |
| <b>Analysis of Full Bridge Series Parallel Resonant Converter for Battery Chargers</b><br>M.S. Rani, J. Samantaray and S.S. Dash                                                                          | 388 |
| <b>Stability Improvement in Power Systems Using Unified Power Flow Controller (UPFC)</b><br>B. Gopinath, S.S. Kumar and J. Michael                                                                        | 392 |

|                                                                                                                                                                          |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Three Input DC-DC Boost Converter for Hybrid Power System with Multilevel Inverter</b><br>J. Narayan and R.J. Uthayakumar                                             | 398 |
| <b>Design and Simulation of Energy Efficient Fixed Frequency Pulse Controlled Power Converter for Induction Melting Application</b><br>N. Booma, S.R. Reddy and M. Beryl | 404 |